



# REPORT ON THE IRRIGATION WORKS

OF THE

## JHALLAWAR STATE

*For year ending December 31st, 1900,*

Sambat year 1957,

WITH SUGGESTIONS FOR

## FUTURE IRRIGATION WORKS

*AS AN INSURANCE AGAINST FAMINE.*

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PREPARED BY

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## REPORT on the Irrigation Works in the Jhallawar State up to December 31st, 1900, and Suggestions for Future Works.

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THE Jhallawar State has now an area of 808 square miles, excluding the territory lately restored to the Kotah State. The population in 1891 was 142,613 excluding the restored territory. In 1901 the population was 90,174. The number of villages in the State is 466, of which 330 are khalsa and 136 are jagir and udak villages. The average land-revenue is about Rs.4,65,914. In 1899-1900 (the famine year) it was about Rs.3,50,000.

The approximate average revenue of the jagir-udak villages is about Rs.1,67,000.

The average yearly cultivated area in the kharif is about 185,000 bighas ; in the rabi, about 26,000 bighas for the khalsa villages ; so that the average cultivated area in each village is about 560 bighas kharif and 80 bighas rabi. These approximate areas of kharif and rabi irrigation, which I have obtained from the Dewan of the State, are, if correct, somewhat remarkable. The kharif area is seven times that of the rabi. In other States I think the rabi area is usually larger than the kharif and more valuable. If the Jhallawar State is so very much dependent on kharif crops for its revenue, it is obvious that years of deficient rainfall would be unusually injurious to the State and exceedingly likely to produce famine.

This seems to explain why the Jhallawar State suffered more than almost any other part of India during the late famine. The imperative need of a plentiful system of storage tanks, large enough to extend and irrigate the rabi crops, is evident. The State has over 80,000 bighas of culturable but uncultivated land.

### RAINFALL.

2. The monthly rainfall for the six years ending December 1900 is given in Appendix A, with a statement showing days on which more than 2 inches of rain was recorded.

From this it appears that the famine occurred after a year (1899) of low rainfall, varying from 14.5 inches to 20.76 inches. The rainfall in this year was very badly distributed, occurring mostly in June and early in July ; after about the middle of July scarcely any rain fell. The average rainfall for the six years ending December 1900 is 34.4 inches per annum. In the projects now recommended, a safe average of 30 inches is assumed.

### ANCIENT TANKS.

3. The principal irrigation works constructed by State or unprofessional agency is given in Appendix B, and fully described. In this State, as in others with which I am acquainted, a very large proportion of the tanks are mere village ponds and quite unfit to be called irrigation works, and incapable of being improved to render them famine insurance works. Thus three tanks, at Patan, Gaonri, and Dhanwara, are good, and out of 120 others only about 6 are worth improving.

## MODERN IRRIGATION WORKS.

4. The irrigation works completed during the last twenty-three years are shown in Appendix C. Only 2 tanks have been made and only one is an irrigation work, *viz.*, the Duragpura Tank. This seems to be a highly efficient work and pays 14 per cent., notwithstanding the fact that in years of deficient rainfall it does not fill. As much better sites for tanks than that at Duragpura are available in various parts of Jhallawar, the State may extend its irrigation works with absolute confidence of a profitable result.

## IRRIGATION WORKS IN HAND.

5. The principal irrigation works commenced, but still incomplete, are described in Appendix D. Four most promising works have been commenced during the late famine, and work on all has been stopped since October last.

Of these works the Mundlakheri Tank is a fine example of an irrigation tank, and will certainly pay a high rate of interest on its cost. It will always fill sufficiently to irrigate the six villages it commands and insure them against famine. It requires only 22 per cent. of an average rainfall to fill it.

The Hathonia Tank is also in a most excellent site, requiring only  $5\frac{1}{2}$  per cent. of an average rainfall to fill it. This tank, when completed, will also absolutely insure the three villages it is to irrigate from famine. It should hereafter be improved and increased to double its present capacity.

The Stratton and Kishenpura Tanks are fairly good, but the former will not always fill. The latter should have its drainage area increased, and the two poor and almost deserted villages of Kishenpura and Bilonia will now become prosperous.

These four tanks, although constructed by famine labour only, are good examples of economical irrigation works. The estimated cost per million cubic feet is as follows :—

					Rs.
(1)	Mundlakheri Tank	..	..	..	185
(2)	Stratton Tank	..	..	..	184
(3)	Kishenpura Tank	..	..	..	258
(4)	Hathonia Tank	..	..	..	158

## PROPOSED NEW IRRIGATION WORKS.

6. In Appendix E twenty-three works are suggested for the irrigation of 59 khalsa and 12 jagir villages.

The khalsa tanks are as follows :—

- 6 tanks of 50 to 80 million cubic feet of water.
- 9 tanks of 100 million cubic feet.
- 6 tanks of 150 to 200 million cubic feet.
- 2 tanks of 300 and 400 million cubic feet.

These tanks will irrigate about 38,900 bighas in khalsa villages and considerably raise the revenues of the State. The Jhallawar State is somewhat

small, and a very large choice of good sites for new tanks does not exist. Many of the sites suggested have, therefore, a small drainage area, *e.g.*, 10 out of 23 have drainage areas of from 2 to 6 square miles, and thus the proportion of rain to be collected is high, varying from 23 to 43 per cent. of the average rainfall. These 10 tanks will not always fill.

The remaining 13 tanks will fill with certainty in all years.

The 120 small ancient tanks or village ponds in the State have drainage area of less than 2 square miles.

Tabulating the totals of the Appendices B, C, D, and E, we get the following :—

Name and description of Work.	ACTUAL OR ESTIMATED AMOUNT OF IRRIGATION AND REVENUE.		Number of villages irrigated.	Estimated or actual cost.	REMARKS.
	Bighas.	Revenue.			
		Rs.		Rs.	
3 ancient tanks, Appendix B ...	827	2,465	3	3,00,000	Fairly efficient, but do not pay high profits.
2 modern tanks, Appendix C ...	1,244	4,637	1	62,000	Only one of these is an irrigation work, and it pays 14 per cent.
4 tanks in process of construction, Appendix D.	10,100	20,200	12	1,15,000	Certain to be paying projects.
23 proposed new works, Appendix E ...	38,900	77,800	59	7,97,000	Likely to pay and act as insurance against famine.
32 irrigation works ...	51,071	1,05,102	75	12,74,000	
				3,57,000	Expended already.
				9,17,000	To be expended.

If all the proposed works were carried out, the result to the Jhallawar State would be that for a further expenditure of Rs.9,17,000, seventy-five villages would be protected from famine, or about 23 per cent. of the total number of khalsa villages in the State. The land-revenue would be raised from Rs.4,66,000 to Rs.5,64,000. The population being 90,174, and the area proposed to be protected by irrigation being about 51,000 bighas, about 0.57 bighas per head would be insured against drought, in addition to the well irrigation that at present exists.

R. H. TICKELL,  
State Engineer,  
Kotah and Jhallawar States.

The 13th April 1901.

*Accompaniments—*

Plan No. 1, Map showing drainage areas of rivers in the Jhallawar State.

Plan No. 2, Index map of irrigation works.

# APPENDIX A.

Statement of Rainfall in the Jhalawar State from 1895 to 1900.

MONTH.	JHALAPATAN.						PANCHPAHAR.						GANGDHAR.						Monthly average for Jhalawar State.	Yearly average for Jhalawar State.	REMARKS.	
	1895.	1896.	1897.	1898.	1899.	1900.	1895.	1896.	1897.	1898.	1899.	1900.	1895.	1896.	1897.	1898.	1899.	1900.				
January	1'38	0'62	...	...	...	...	1'17	...	...	...	...	...	0'03	...	0'30	...	...	...	...			
February	...	...	...	0'49	...	...	0'20	...	...	1'26	...	...	...	...	...	...	0'45	...	...			
March	...	...	...	...	...	...	0'08	...	...	...	...	...	0'08	...	...	...	...	...	...			
April	...	...	...	...	...	0'70	0'10	...	...	...	...	0'44	0'41	...	0'03	...	...	...	0'24			
May	...	...	...	0'20	0'10	0'35	...	...	0'15	...	1'38	0'02	...	...	0'02	...	0'83	0'15	...			
June	...	3'52	9'90	3'39	12'00	0'92	6'73	9'09	4'43	1'99	7'31	1'64	8'07	9'40	3'87	1'70	7'71	5'75	...			
July	...	11'42	13'00	6'02	8'87	11'62	5'55	5'81	6'07	8'44	5'95	9'54	7'39	17'01	6'66	11'13	2'77	12'54	...			
August	...	17'67	9'93	15'46	8'54	0'37	28'49	11'16	11'09	5'94	1'29	35'53	13'80	26'18	8'90	12'24	0'95	26'06	...			
September	...	1'23	...	4'86	7'31	...	11'42	0'08	2'26	3'87	0'15	10'35	9'33	...	3'02	3'38	1'89	23'18	...			
October	...	0'36	...	...	...	...	0'11	...	...	...	0'03	...	0'76	...	0'70	...	0'20	...	...			
November	...	...	0'99	...	...	...	...	2'27	...	...	...	0'11	...	0'58	...	...	...	0'25	...			
December	...	...	0'50	1'60	...	0'42	0'22	0'76	...	1'82	0'12	0'64	...	0'72	...	1'41	0'15	0'21	...			
Total	...	36'50	34'32	31'63	30'40	20'76	53'92	27'36	20'20	24'00	27'32	16'23	58'37	39'87	53'89	23'50	30'31	14'50	68'36	2'87	34'46	

*Statement of Rainfall of more than 2 inches in one day for the Jhallawar State.*

Date.				Jhalrapatan.	Panchpahar.	Gangdhar.	REMARKS.
1895.							
June	...	...	11	...	3'03	...	
July	...	...	22	...	2'05	...	
August	...	...	21	2'11	...	...	
"	...	...	23	...	...	2'85	
"	...	...	31	2'75	...	3'85	
1896.							
June	...	...	19	...	...	3'70	
"	...	...	20	3'43	...	...	
"	...	...	23	3'34	...	...	
July	...	...	7	2'75	...	...	
"	...	...	8	2'20	2 23	...	
1900.							
June	...	...	8	...	...	3'50	
July	...	...	12	3 93	...	...	
"	...	...	14	...	...	3 65	
August	...	...	5	...	...	3'20	
"	...	...	8	...	3'55	...	
"	...	...	12	...	...	2'10	
"	...	...	20	5'95	8'12	3'70	
"	...	...	21	3 91	3 73	4'50	
"	...	...	28	4'09	3 30	4 99	
"	...	...	29	4'53	2'75	...	
"	...	...	31	4'35	6'30	3'05	
September	...	...	1	2'76	...	...	
"	...	...	10	...	...	11'50	
"	...	...	11	...	...	4'68	
"	...	...	12	...	...	2'17	



# APPENDIX B.

## Tanks and Irrigation Works constructed by State or Unprofessional Agency in Jhallawar.

Serial No.	Index No.	Name of Tank.	Site.	Catchment area in square miles.	Capacity.	Percentage of 30" rainfall required to fill Tank.	Length and description of bund.	Average irrigated area and revenue for five years ending July 1899.	Reported cost.	REMARKS.
1	1	Patan City Tank.	Jhalrapatan City	7 sq. miles	132 mill. c. ft. ...	27	Masonry bund backed with earth, 3,100 feet.	Bighas. About 400 Rs. 1,200	Rs. 1,50,000	An old tank constructed over 100 years ago. A new Palace has been built on the bund, the gardens of which are watered by the tank. An aqueduct of masonry about a mile long is in ruins, and so very little irrigation is done.
2	2	Gaonri Tank	Gaonri Suburb of Jhalrapatan.	1 1/2 sq. miles	80 mill. c. ft. ...	65	Masonry bund backed with earth, 2,000 feet.	255 750	1,00,000	An old tank constructed about 100 years ago. The gardens in and around Jhalrapatan Chaoni are dependent on this tank for their irrigation. Most of these being public or State gardens, but little revenue is obtained.
3	4	Dhanwara Tank	Dhanwara Suburb of Jhalrapatan.	1 sq. mile	15 mill. c. ft. ...	21	Masonry bund backed with earth, 1,000 feet.	172 515	50,000	The tank usually does not more than half fill owing to its very small catchment. A rainfall of 42 inches or more will fill it. A small tank for the irrigation of a few gardens at the east of Jhalrapatan Chaoni.
		Over 120 village ponds and small ancient tanks.	Various	70 sq. mile to 2 square miles.	10 mill. c. ft. to 15 mill. c. ft.	50 to 200	Various kinds 100 to 1,000 feet long.	Unknown, but very little. 827 2,465	3,00,000	Total number of villages irrigated = 3. About half-a-dozen of these tanks might be improved, but none would be efficient in famine years, as the drainage area in all cases is too small for the tanks to fill in years of deficient rainfall.

## APPENDIX C.

### *Principal Irrigation Works constructed by Professional Agency in the Jhalawar State during the last twenty-three years.*

Serial No.	Index No.	Name of Work.	Site.	Catchment area.	Capacity of Tank.	Percentage of 30" rainfall required to fill tank.	Length and description of Bund.	AVERAGE IRRIGATED AREA AND NOT REVENUE FOR FIVE YEARS ENDING JULY 1899.		Actual cost.	Number of years since completed and net profit to date.	REMARKS.
								Bighas.	Revenue.			
1	3	Naya Talao	Chaoni Jhalrapatan.	1 sq. mile	10 mill. c. ft.	14	Masonry bund backed with earth, 1,500 c. ft.	About 10	About 20	Rs. 30,000	22 years.	A small tank constructed for the convenience of the people in Jhalrapatan Chaoni; not intended for irrigation.
2	5	Durgapura Tank...	2 miles from Jhalrapatan.	2 sq. miles	50 mill. c. ft.	43	Masonry bund backed with earth.	1,234	4,617	32,000	22 years, Rs. 30,000.	A very useful little tank, but owing to its small drainage area it does not always fill. The tank pays 14 per cent., and irrigates one village.
								1,244	4,637	62,000	..	Total number of villages irrigated = 1.

# APPENDIX D.

## Principal Irrigation Works at present in progress in the Jhalawar State.

Serial No.	Index No.	Name of Work.	Site.	Catchment area.	Capacity of Tank.	Percentage of 30" rainfall required to fill Tank.	Length and description of Bund.	Estimated irrigated area and revenue.		Estimated cost.	Expenditure to end of December 1900.	REMARKS.
1	8	Mundlakheri Tank ...	Jhalrapatan City	25 sq. miles ...	484	22	Earthen bund. 7,600 feet.	Bighas. 6,000	Rs. 12,000	Rs. 65,000	Rs. 25,000	A very fine tank, commenced during the famine of 1900. It is a continuation of the Patan Tank, which it extends and improves, increasing the capacity of the Patan Tank from 132 million cubic feet to 484 million cubic feet for the combined tank 406 million cubic feet area available for the irrigation of six villages. The drainage area of the combined tanks is 25 square miles, and so when completed it will require only 22 per cent. of a 30" rainfall to fill the combined tanks as compared with 27 per cent., which the old Patan Tank required. The improved tank is, therefore, much more likely to fill annually. The old Patan Tank did not fill in years of small rainfall. The project should pay about 18 per cent.
2	7	Stratton Tank ...	Khandia Suburb of Jhalrapatan.	17 sq. mile ...	65 mill. c. ft. ...	52	Earthen bund, 2,100 feet.	800	1,600	12,000	8,500	A small tank for the irrigation of one village and part of Jhalrapatan, and for the convenience of travellers, from Chaoni to Jhalrapatan city. The catchment area is very small, and a very high percentage of an average rainfall is required to fill the tank. The tank has benefit of percolation from the Gaonri Tank, and so there are hopes of its filling with tolerable regularity. When it fills it should pay 10 to 13 per cent. The tank is two-thirds completed. The site was selected by His Highness the Raj Rana and named after Captain Stratton, Political Agent, Kotah and Jhalawar.

3	6	Kishenpura Tank ...	Kishenpura, 4 miles from Jhalrapatan.	3½ sq. miles	...	97 mill. c. ft.	...	40	Earthen bund, 4,000 feet.	1,500	3,000	25,000	17,000	A tank for the irrigation of Kishenpura, a deserted village, and Bilonia, commenced during the famine of 1900, and now nearly completed. It should certainly pay 12 per cent. as much fertile land is commanded by it. The site was selected by His Highness the Rāj Rana. The drainage area is small, and the tank will not always fill; but the neighbouring nullah at Bilonia can be diverted into the tank at a cost of about Rs.10,000, and this would increase the catchment to 4½ square miles and reduce the percentage of flow off of rain from 40 to 30.
4	14	Hathonia Tank ...	Panchpahar Tehsil.	21 sq. miles	...	82 mill. c. ft.	...	5½	Earthen bund, 2,900 feet.	1,800	3,600	13,000	7,000	A tank for the irrigation of three villages commenced during the famine of 1900. The site is most excellent, and the bund can hereafter be raised and extended, if found advisable to form a tank of 150 to 200 million cubic feet. The tank should pay from 20 to 27 per cent.
										10,100	20,200	1,15,000	57,000	Total number of villages to be irrigated = 12.

# APPENDIX E.

## Programme of Irrigation Works for future consideration.

Serial No.	Index No.	Name of Work.	Site.	Catchment area.	Capacity of Tank.	Percentage of 30" rainfall required to fill the Tank.	Length and description of Bund.	ESTIMATED IRRIGATED AREA AND REVENUE.		Estimated cost.	Estimated profit on cost.	REMARKS.
								Bighas.	Revenue.			
1	9	Sarangkheri Tank	Patan Tehsil...	12 sq. miles	150 mill. c. ft.	18	Earthen bund, 6,000 feet.	2,700	Rs. 5,400	Rs. 45,000	12	A fine site for a tank to irrigate four villages.
2	10	Jhumki Tank	Ditto	3 sq. miles	50 mill. c. ft.	24	Earthen bund, 4,000 feet.	900	1,800	12,000	15	A tank to irrigate one village.
3	11	Motipura Tank	Ditto	10 sq. miles	100 mill. c. ft.	...	Earthen bund, 5,000 feet.	1,800	3,600	30,000	12	A tank to irrigate two villages.
4	12	Rewa River Tank	Imliakheri Patan Tehsil.	70 sq. miles	300 mill. c. ft.	6	Masonry bund, backed with earth, 12,000 feet.	5,600	11,200	90,000	12	A tank to irrigate nine villages (of which four are jagir villages), with 2 canals, totalling 12 miles, one on each side of the river.
5	13	Basnia Tank	Panch Pahar Tehsil.	30 sq. miles	150 mill. c. ft.	7	Earthen bund, 6,000 feet.	2,700	5,400	45,000	12	A tank to irrigate four jagir villages.
6	15	Panch Pahar Tank	Panch Pahar	20 sq. miles	200 mill. c. ft.	14	Earthen bund, 10,000 feet.	3,400	6,800	60,000	11	A tank to irrigate five villages. The site is a most excellent one, and the remains of a small old tank exist here.
7	16	Anandpura Tank...	Panch Pahar Tehsil.	7 sq. miles	100 mill. c. ft.	20	Earthen bund, 5,000 feet.	1,800	3,600	30,000	12	A tank for the irrigation of two villages.
8	17	Ratanpura Tank	Ditto	4 sq. miles	80 mill. c. ft.	28	Earthen bund, 4,000 feet.	1,200	2,400	25,000	9	Do. do. do. do.
9	18	Motra Tank	Ditto	12 sq. miles	100 mill. c. ft.	21	Earthen bund, 5,000 feet.	1,800	3,600	30,000	12	Do. do. do. two jagir villages.
10	19	Karawan Tank	Awar Tehsil...	7 sq. miles	100 mill. c. ft.	20	Earthen bund, 5,000 feet.	1,800	3,600	30,000	12	A tank for the irrigation of one village.

11	20	Singaura Tank	...	Ditto	...	2 sq. miles	...	50 mill. c. ft.	35	Earthen bund, 4,000 feet.	800	1,600	20,000	8	A tank for the irrigation of one village.
12	21	Barpur Tank	...	Ditto	...	20 sq. miles	...	200 mill. c. ft.	14	Earthen bund, 10,000 feet.	3,400	6,800	60,000	11	Do. do. six villages.
13	22	Benaiga Tank	...	Ditto	...	4 sq. miles	...	80 mill. c. ft.	29	Earthen bund, 4,000 feet.	1,200	2,400	25,000	9	Do. do. two do.
14	23	Lovaria Tank	...	Dag Tehsil	...	3½ sq. miles	...	Ditto	32	Earthen bund, 4,000 feet.	1,000	2,000	25,000	8	Do. do. two do.
15	24	Dag Tank	...	Ditto	...	6 sq. miles	...	100 mill. c. ft.	23	Earthen bund, 5,000 feet.	1,800	3,600	30,000	12	Do. do. two do.
16	25	Chokri Tank	...	Ditto	...	16 sq. miles	...	150 mill. c. ft.	13	Earthen bund, 8,000 feet.	2,700	5,400	45,000	12	Do. do. four do.
17	26	Tarsai Tank	...	Ditto	...	Ditto	...	100 mill. c. ft.	9	Earthen bund, 5,000 feet.	1,800	3,600	30,000	12	A tank for the irrigation of two jagir villages.
18	27	Jamunia Tank	...	Ditto	...	5 sq. miles	...	150 mill. c. ft.	43	Earthen bund, 8,000 feet.	1,200	2,400	45,000	5½	A tank for the irrigation of three villages.
19	28	Kuchnia Tank	...	Gangdhar Tehsil.	...	9 sq. miles	...	100 mill. c. ft.	16	Earthen bund, 5,000 feet.	1,800	3,600	30,000	12	Do. do. two do.
20	29	Kalisindh River Bund,	...	Sarwar Gangdhar Tehsil.	...	900 sq. miles	...	400 mill. c. ft.	12	Masonry bund.	5,400	10,800	1,50,000	...	The chota Kalisindh river which passes near Gangdhar, and has a drainage area of about 900 square miles, might be banded up near Sarwar and the irrigation of nine villages could be effected by two canals, totalling about 20 miles. The kharif irrigation could be done by the natural flow of the river and the tank reserved for the rabi.
21	30	Semli Tank	...	Gangdhar Tehsil.	...	5 sq. miles	...	100 mill. c. ft.	29	Earthen bund, 5,000 feet.	1,200	2,400	30,000	8	A tank to irrigate two villages.
22	31	Dokarkheri	...	Ditto	...	4 sq. miles	...	100 mill. c. ft.	35	Ditto	1,000	2,000	30,000	6½	Do. do. two do.
23	32	Baria Tank	...	Awar Tehsil...	...	2 sq. miles	...	60 mill. c. ft.	42	Ditto	700	1,400	25,000	4	Do. do. two do.
											47,700	95,400	9,42,000	...	Total number of villages to be irrigated, 59 khalsa and 12 jagir.
											38,900	77,800	7,97,000		
											8,800	17,600	1,45,000		